BRITISH COLUMBIA
MINISTRY OF FORESTS

Tree Farm Licence 30

Issued to Canadian Forest Products Ltd.

Rationale for Allowable Annual Cut (AAC) Determination

Effective July 1, 2003

Ken Baker
Deputy Chief Forester

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Objective of this document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 30. This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the TFL

TFL 30, held by Canadian Forest Products Ltd. (Canfor), is located just north-east of the city of Prince George and is administered by the British Columbia Forest Service (BCFS) Prince George Forest District. The tree farm licence area covers a total of 182 298 hectares, of which 158 862 hectares (87 percent) are classified as productive forest that is managed by Canfor. The remaining area (22 949 hectares) is comprised mostly of non-productive lands including rock, lakes, wetlands, swamp, roads and shrub lands, as well as non-TFL private lands and a small class A provincial park.

The topography on the majority of the TFL area is gentle, characteristic of the central interior plateau, with steeper mountainous terrain along the far north-eastern boundary. The TFL is subject to heavy snowfalls and substantial summer rainfall. Most of the operable forest lies within the very wet and wet cool variants of the Sub-Boreal Spruce biogeoclimatic zone, with small portions in the higher elevations of the Engelmann Spruce Subalpine Fir and the wetter Interior Cedar Hemlock biogeoclimatic zones.

High precipitation and nutrient rich soils in the TFL have had the effect of creating some of the most productive growing sites in the northern interior of the province. These highly productive sites, combined with few stand-initiating disturbances, have resulted in older forests that have provided high-quality spruce sawlogs over the past 40 years.

History of the AAC

In 1959, the original TFL 30 was issued to *Sinclair Spruce Lumber Company Ltd.*, with an AAC equivalent to 30 384 cubic metres. In 1966 TFL 30 was amalgamated with TFL 31 (McGregor TFL – *Upper Fraser Spruce Mills Ltd.*) and TFL 34 (Seebach TFL – *Church Sawmills Ltd.)*. As a result the TFL 30 AAC was increased to 104 773 cubic metres. In 1967, TFL 28 (Shelley TFL – *Shelley Development Ltd.*) and TFL 29 (Eagle Lake TFL – *Eagle Lake Sawmills Ltd.*) were amalgamated with TFL 30 and the new AAC determined at 212 378 cubic metres.

In 1971, *Sinclair Spruce Lumber Company Ltd.* changed its name to *Northwood Timber Ltd.* By 1976, the AAC was increased to 440 950 cubic metres, which reflected the change from intermediate utilization to close utilization, improved utilization standards, and the inclusion of deciduous stands in the timber harvesting land base.

By October 1996, the AAC was reduced to 350 000 cubic metres as a result of improved information regarding standing mature inventory volumes and management of landscape-level biodiversity values through the implementation of the Forest Practices

Code. In November 1999, TFL 30 changed ownership and is currently issued to *Canadian Forest Products Ltd.*

New AAC determination

Effective July 1, 2003, the new AAC for TFL 30 will be 330 000 cubic metres, a reduction of 20 000 cubic metres or 5.7 percent from the current AAC.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination unless the determination is postponed according to the provisions of Section 8 of the *Forest Act.*

Information sources used in the AAC determination

Information considered in determining the AAC for TFL 30 include the following:

- *TFL 30 Management Plan No. 9 - Timber Supply Analysis Data Inputs and Assumptions Report*, McGregor Resource Analysis Group, July 5, 2001;
- *Managed Stand Yield Tables Incorporating Spruce Weevil Effects for TFL 30 Management Plan 9*, JS Thrower & Associates Ltd., July 30, 1999;
- *Yield Table Summary Report: Canfor TFL 30 – Prince George (MSYTs and NSYTs) Version 2*, JS Thrower & Associates Ltd., December 6, 2000;
- *Potential Site Index Estimates for the Major Commercial Tree Species on TFL 30*, J.S. Thrower and Associates Ltd., March 31, 2000;
- *Review of TFL 30 Yield Table vs VRI Ground Sample Plot Volume Analysis*, Ministry of Sustainable Resource Management, Terrestrial Information Branch/Prince George Region Ministry of Forests, June 17, 2002;
- *Characteristics and Management of American Martin Habitat at Stand and Landscape Levels*, Gilbert Proulx, Ph.D., R.P.F., March 21, 2001;
- *TFL 30 Management Plan No. 9 Timber Supply Analysis Report*, McGregor Resource Analysis Group, May 29, 2002;
- *Supplemental sensitivity analysis with respect to patch size, provincial loss factors and alternative harvest flows on TFL 30*, Bill Wade letter to Ken Baker, July 2, 2002;
- *Twenty Year Plan - TFL 30 Management Plan Number 9*, Canadian Forest Products Ltd., Dec 21, 2001;
- *Management Plan 9, Tree Farm Licence 30, Canadian Forest Products Ltd.*, approved October 24, 2002;
- *Sustainable Forest Management Plan, Tree Farm Licence 30, Canadian Forest Products Ltd., Prince George Operations*, updated to June 26, 2002;
- *Prince George Timber Supply Area Analysis Report*, September, 2001;

- *The 1996 Forest District Tables*, Ministry of Finance and Corporate Relations, April 1996;
- Memorandum from the Director of Timber Supply Branch of the Ministry of Forests, dated December 1, 1997, entitled *Incorporating Biodiversity and Landscape Units in the Timber Supply Review*;
- *Identified Wildlife Management Strategy*, February 1999;
- *Landscape Unit Planning Guide*, BCFS and MELP, March 1999;
- *Higher Level Plans: Policy and Procedures*, BCFS and MELP, December, 1996;
- *Landscape Unit Planning Strategy for the Prince George Forest District*, December 1997;
- *Forest Practices Code of British Columbia Act* (Forest Practices Code), consolidated to May 2002;
- *Forest Practices Code of British Columbia Act Regulations and Amendments*, current as of May 2002;
- *Forest Practices Code of British Columbia Guidebooks*, BCFS and MELP;
- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives;
- Memorandum from the Minister of Forests to the Chief Forester, dated February 26, 1996, stating the Crown's economic and social objectives with regard to visual resources;
- Technical review and evaluation of current operating conditions on TFL 30 through comprehensive discussions with BCFS and MSRM staff, notably during a tour of the TFL on November 8, 2001 and at the AAC determination meeting held in Victoria on September 19 and 20, 2002;
- *Prince George Land and Resource Management Plan*, March 1999.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological, and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural, and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for TFL 30, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and TFLs. Section 8 is reproduced in full as Appendix 1.

In accordance with Section 23(3) of the *Interpretation Act*, the deputy chief forester is expressly authorized to carry out the functions of the chief forester, which include those required under Section 8 of the *Forest Act*.

The chief forester has expressed the importance of consistency of judgement in making AAC determinations. I also recognize the need for consistency of approach. I have observed the chief forester during a number of previous AAC determinations and am familiar with the guiding principles that the chief forester has employed in making AAC determinations. I find these principles to be reasonable and appropriate and I have adopted them as described below in making my AAC determination for TFL 30.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. When a large number of determinations are made for many forest management units over extended periods of time, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainty. To make his approach in these matters explicit, the chief forester has compiled a set of guiding principles for AAC determinations. I have reviewed these principles and find them to be reasonable, and thus I have adopted and applied them as deputy chief forester in AAC determinations for TFLs. These principles are set out below. If in some specific circumstance it may be necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge, a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires the chief forester to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation of current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code of British Columbia Act* and its associated regulations (the Forest Practices Code).

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although the Forest Practices Code has been fully implemented since the end of the transition period on June 15, 1997, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination the chief forester takes this uncertainty into account to the extent possible in the context of the best available information. In making my determination for TFL 30, as deputy chief forester, I have followed the same approach.

More recently, on November 21, 2002, government passed the new *Forest and Range Practices Act*, which is expected to take effect in late 2003, ultimately replacing the *Forest Practices Code of British Columbia Act*. As the timber supply implications of this new Act and any pursuant regulations become clear and measurable, they will be accounted for in AAC determinations. Uncertainties will continue to be handled as they have been under the current legislative regime.

As British Columbia progresses toward completion of strategic land-use plans, the timber supply impacts associated with the land-use decisions resulting from the various planning processes are important to AAC determinations. Where specific protected areas have been designated by legislation or by order in council, these areas are no longer considered to be part of the timber harvesting land base or to contribute to the timber supply in AAC determinations.

Because the outcomes of planning processes are subject to significant uncertainty until formal approval by government, it has been and continues to be the position of the chief forester that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions that have not yet been taken by government. I consider this approach to be reasonable and appropriate.

Like the chief forester, I will therefore not take into account the possible impacts of existing or anticipated recommendations made by such planning processes, nor attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impact in a current AAC determination. In many cases, government's land-use decisions must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

The Forest Investment Account (FIA) and its predecessor Forest Renewal British Columbia funded a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long term. As with all components of an AAC determination, like the chief forester, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs in the province between 1992 and 1996. In any case, the data and models available today are improved from those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, the chief forester should immediately reduce some AACs in the interest of caution. However, any AAC determination made by the chief forester or myself must be the result of applying our individual judgement to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I have made allowances for risks that arise because of uncertainty.

Overall, in making this AAC determination, as deputy chief forester, I am mindful of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act* and of the chief forester's responsibilities under the *Forest Practices Code of British Columbia Act* and the *Forest Act*.

Guiding principles with respect to First Nations

With respect to First Nations' issues, I am aware of the Crown's legal obligations, particularly as clarified in judgements by the Supreme Court of Canada and the British Columbia Court of Appeal. The AAC that I have determined should not in any way be construed as limiting those obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within TFL 30.

The British Columbia Court of Appeal decided in March 2002 that the Crown has an obligation to consult with First Nations with respect to asserted rights and title in a manner proportional to the apparent strength of the claimed interests. As a matter of course, I consider any information brought forward by all parties respecting First Nations' interests. In particular I consider information related to actions taken to protect interests, including operational plans that describe forest practices designed to address First Nations' interests. In this context, I stress that my AAC determination does not prescribe a particular plan of harvesting activity, nor does it involve allocation of the wood supply to any particular party.

Subsequent to a determination, if I become aware of information respecting First Nations' interests that would substantially alter my understanding of relevant circumstances, I may revisit my determination sooner than as required by the *Forest Act*.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me as part of the Timber Supply Review program.

For each AAC determination for a TFL a timber supply analysis is carried out using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model, a series of timber supply forecasts is produced, reflecting different starting harvest levels, rates of change over time, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TFL is not a portrayal of AACs over time. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it. In some cases, an AAC is determined that coincides with the base case starting point. In other cases, an AAC is determined which differs

significantly from the modelled starting point.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which the assumptions made in generating the base case forecast are realistic and current, and the degree to which I believe its predictions of timber supply should be adjusted to more properly reflect the current situation.

These adjustments are made on the basis of informed judgement, using current available information about forest management, which may have changed since the original information package was assembled. Forest management data are particularly subject to change during periods of legislative or regulatory change, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but rather is a synthesis of analysis and judgement in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the initial harvest level in a base case forecast. Judgements that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Timber supply analysis

The timber supply analysis for TFL 30 was prepared by the McGregor Resource Analysis Group under the direction of the licensee, Canfor. Forest Planning Studio (FPS–ATLAS), a spatially explicit forest level simulation model developed at the University of British Columbia, was used to provide the timber supply forecasts. FPS-ATLAS is designed to schedule harvests according to a range of spatial and temporal objectives assigned to stands. The forecasts from the timber supply model were reviewed by BCFS staff knowledgeable about the model. These staff were able to advise me about the function of this model, and any associated implications for harvest projections.

Based on a benchmarking study comparing FPS-ATLAS to the Ministry of Forests' model (FSSIM) and my experience reviewing timber supply projections from this model in a previous determination, I am satisfied that it is capable of providing reasonable projections of timber supply.

The inventory used for the analysis was updated for disturbance to December, 2000. Therefore, for the first year in the base case the analyst programmed the model to harvest the areas (polygons) and volumes actually harvested on TFL 30 in the year 2001. The volume harvested in 2001 was 350 000 cubic metres, equalling the previous AAC. After 2001 in the model the Category A blocks from the approved forest development plan were scheduled for harvest. According to the licensee, as these blocks were approved for harvesting, they were harvested in the model regardless of the forest cover constraints imposed. Therefore, during this period the level of violation of some forest cover constraints increased. Following this period, no specific block scheduling constraints

were applied.

Using the assumptions inherent in the base case, following the first year in the base case forecast the harvest level declined by 19 percent to approximately 285 000 cubic metres per year. This level was maintained for the remaining nine years of the first decade. The forecast then declined at 12 percent each decade until the fourth decade when it attained a mid-term low of 193 700 cubic metres per year. After the fourth decade the forecast increased attaining a long-term harvest level of 508 759 cubic metres per year in the ninth decade.

I note that the calculated biological maximum productivity of TFL 30 (referred to as the long run sustained yield or LRSY) is 640 459 cubic metres per year, or 26 percent higher than the long term harvest level. I find this an unusually large difference; in my experience the difference in other units is most often less than 20 percent and often less than 10 percent. The large difference in this analysis is largely attributable to constraints in the model which in the long term cause stands to be harvested on average 42 years past the age at culmination of mean annual increment.

In the timber supply analysis, various sensitivity analyses were conducted to assess the potential implications for timber supply arising from uncertainty in data assumptions and estimates. These analyses have also assisted me in considering the factors leading to my determination.

As discussed throughout this rationale, and in consideration of the items described above, I am satisfied that the information presented to me provides an adequate basis from which I can assess the timber supply for TFL 30 for this determination.

In this rationale, I will discuss several of the analysis assumptions in the context of my considerations for this AAC determination. However, where my review of an assumption has concluded that I am satisfied it was appropriately modelled in the base case, I will not discuss my considerations in detail in this document, other than to note my agreement with the approach that is already documented in the licensee's analysis report. Some factors for which the assumptions were appropriately modelled in the analysis warrant discussion, however, for other reasons, such as a high level of public input, lack of clarity in the analysis report, or concerns resulting from the previous determination for TFL 30. I will explain my consideration of such factors in this rationale.

First Nations considerations

Two First Nations have asserted aboriginal interests in TFL 30, the McLeod Lake Indian Band and the Lheidli T'enneh First Nation. On June 27, 2002, both were provided copies of the timber supply analysis information package and analysis, and were invited to review the documents and provide written comments related to how their aboriginal interests could be affected by my AAC determination. As well, the district manager extended an offer to arrange a meeting between the First Nations and appropriate government and industry representatives, if requested. District staff indicated that no written or verbal responses or requests for meetings or presentations were received as a result of the invitation to comment and meet.

I am aware that the McLeod Lake Indian Band has treaty rights to hunting, fishing, and trapping, which extend into the north-western corner (in the Arctic drainage) of the TFL. To date, no specific concerns have been raised regarding this area.

The McLeod Lake Indian Band was inadvertently not included under Treaty No. 8, signed in 1899. A review of historical evidence found that, although the band was overlooked, its ancestors inhabited the area covered by the treaty and were entitled to adhere to it. Therefore, in 2000, after several years of negotiation, the McLeod Lake Indian Band and the federal and provincial governments signed the final settlement agreement, essentially adhering the Band to Treaty No. 8. Key elements contained in the agreement include land, and money for specified treaty benefits, other claims, and negotiating costs. The Agreement also included provisions for payment to the band of stumpage collected for timber cut on the reserve land from 1995 to the date Canada accepted the negotiated lands. None of the reserve lands are located within TFL 30.

I understand that to date there are no known archaeological or cultural issues in the portion of TFL 30 covered by the McLeod Lake Indian Band's area of interest.

The Lheidli T'enneh's area of interest covers the remaining TFL area. I understand from district staff that, to their knowledge, the relationship between Canfor and the Lhiedli T'enneh has been open.

TFL 30 is also coincident with the boundary of the McGregor Model Forest, in which the Model Forest Association (MFA) has pursued leading-edge research and forest estate modelling for eleven years. The Lheidli T'enneh, the McLeod Lake Indian Band, and Canfor are members of the McGregor Model Forest Association, and all have actively participated in its activities.

In early March, 2003 the Lheidli T'enneh were invited to submit a proposal for a forest licence in the adjacent Prince George TSA for 150 000 cubic metres of timber over three years, with the possibility of extension for an additional two years.

The Lheidli T'enneh are participating in the British Columbia Treaty Process and are currently nearing completion of stage four, negotiating an Agreement-in-Principle (AIP). On May 2, 2003 the Chief Negotiators completed an AIP document, which they have now recommended for approval to their principals, the governments of British Columbia, Canada and Lheidli T'enneh. The Agreement envisions transfer of 4 027 ha of Crown and existing reserve land, and $12.8 million in capital transfer, and provides for the settlement of various land and resource issues. It also provides for the negotiation of a governance agreement. The principals are expected to make their decisions with respect to approval in the near future. None of the Crown land in the AIP covers TFL 30.

In its Sustainable Forest Management Plan, Canfor indicates that both the McLeod Lake Indian Band and the Lheidli T'enneh First Nation actively participate in the Public Advisory Group (PAG) which was established as part of the related third-party certification process. In its Management Plan No. 9, Canfor commits to jointly develop measures to conserve traditional uses and practices. Canfor expects that the First Nations' participation in the PAG will help in accomplishing this objective.

At this time, the information I have considered suggests that no additional adjustments or measures related to traditional uses are required beyond the land base exclusions and management objectives incorporated in the timber supply analysis. I encourage continued consultation with First Nations on administrative and operational activities, as is normal practice in the province, to enable design and timing of forest operations to minimize and hopefully eliminate negative impacts on First Nations' entitlements.

I am satisfied that district and licensee staff have provided adequate opportunities for consultation with local First Nations to enable aboriginal interests to be considered and addressed in my determination. After considering the information available to me, I am not aware of any information that indicates that First Nations interests will be negatively impacted by my AAC determination. While I am aware of general expression of aboriginal interests in the TFL area, the nature scope and geographic location of these interests remain inconclusive.

If I become aware of significant new information on aboriginal interests, I will consider it in the next scheduled AAC determination, or will re-visit my determination sooner if warranted.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

Land base contributing to timber harvesting

- general comments

As part of the process used to define the timber harvesting land base in the base case, a series of deductions were applied to the productive forest land base. These deductions account for the factors that effectively reduce the suitability or availability of the productive forest area for harvest, for ecological, economic or social reasons. For TFL 30, these deductions resulted in a long-term timber harvesting land base of 116 779 hectares, or about 73 percent of the productive forest.

I have considered all of the deductions applied in the derivation of the timber harvesting land base for TFL 30. I accept without further discussion the exclusions applied for non-productive lands, non-commercial brush, existing and future roads, trails, and landings, deciduous, and unstable terrain. I also accept without further discussion the assumptions concerning the Horseshoe, Tri-Lakes and Woodall recreation areas.

Where I believe an assumption in the base case is incorrect, or does not represent current practice, or where I believe a factor requires discussion, it is presented in the following sections of this rationale.

Within the boundaries of TFL 30 lies a parcel of private land that covers 429 hectares and is neither covered by TFL 30 nor managed by the licensee. For the analysis, Canfor assumed that 359 hectares of productive forest within this area contribute to forest cover requirements such as landscape-level biodiversity objectives.

As management of this parcel is beyond the licensee's control, I find it highly uncertain that the landowner will manage the parcel in a way that will benefit landscape-level biodiversity objectives or any other objectives on TFL 30. I therefore believe the base case timber supply may well be over-estimated in the long term on this account by an unknown small amount and I will discuss this under *'Reasons for Decision'*.

- low productivity stands – minimum economic yield

In the base case Canfor identified low productivity stands based on minimum economic yield criteria. The minimum yields were specified by the licensee by harvest system and leading species. Based on the existing stand yield tables, stands within each harvest system/leading species combination that did not meet the minimum economic yield by the threshold age assigned by Canfor were excluded from contributing to timber supply. About 18 530 hectares were deducted from the productive forest land base to account for these low productivity stands.

After accounting for all other overlapping land base deductions, 6661 hectares were excluded from the timber harvesting land base specifically based on the minimum economic criteria. The average volume per hectare of the excluded stands was about 110 cubic metres.

Canfor pointed out that using existing stand yield estimates based on inventory site indices rather than managed stand yield estimates based on adjusted site indices in the derivation of minimum economic yield may have resulted in too much area being deducted on this account. The licensee notes that if managed stand yield estimates had been used, some of the stands excluded in the base case would have attained volumes in excess of the minimum yield criteria by the specified threshold age, and therefore would have been included in the assumed timber harvesting land base.

Canfor performed a sensitivity analysis that showed if all of the 6661 hectares of low productivity areas were included in the timber harvesting land base, then the short-term timber supply would increase by approximately 1 percent, medium-term supply would be unaffected, and long-term supply would increase by about 5 percent.

I note that inclusion in the timber harvesting land base of all the area assumed in the base case to be of low productivity would not alleviate the short- and medium-term timber supply shortage projected in the base case. This is in part related to the extent that these areas are covered with old growth. If these areas were harvested, alternate areas would have to be retained to satisfy landscape-level biodiversity objectives for old growth retention, resulting in little net gain to timber supply. Nevertheless, I encourage the licensee to review these areas for the next determination to ensure the appropriate area is modelled as contributing to timber supply. For this determination I am satisfied that the base case assumptions provide an adequate accounting of low productivity sites on TFL 30 and I make no adjustments on this account.

Existing forest inventory

The inventory data used for the timber supply analysis was based on a new vegetation resources inventory (VRI) completed by the licensee in the spring of 2000. Both Phase I and Phase II of the VRI were completed. VRI Phase I mapping was based on photo interpretation using 1995 aerial photography, and VRI Phase II volume adjustments were based on 267 ground samples collected between 1997 and 1999.

Because destructive sampling used to derive net volume adjustment factors (NVAFs) was not completed during Phase II of the VRI, existing stand net merchantable volume estimates were based on the standard 1976 loss factors. A NVAF is the ratio of a tree's actual net merchantable volume (measured using destructive sampling) to the volume estimated by a timber cruiser. NVAF sampling is currently considered to provide measures of net merchantable volume of stands after reductions for decay and other factors that are more accurate than the standard 1976 loss factors.

For the analysis, harvesting activities were updated to December 2000 using Canfor's forest development plan mapping. Existing stand attributes such as age, volume and height were also projected to 2000.

I have considered the information about the forest inventory, and am satisfied that the best available information was used in the analysis.

- estimates of existing stand volumes

The licensee used the Variable Density Yield Prediction (VDYP version 6.6d) model to generate yield tables for all existing unmanaged (natural) stands. These stands currently cover about 68 percent of the productive forest land base on TFL 30.

To generate the VDYP yield tables for the base case the licensee used the VRI Phase I (photo interpreted) inventory attributes adjusted using VRI Phase II ground sample data. The licensee used the Phase II ground sample data to calculate single "all age" adjustment factors for height, age and volume.

During the review of the existing stand yield tables two issues were identified. BCFS staff questioned the application of a single "all age" adjustment factor noting that adjustments for older stands are often different than those for younger stands, and MSRM staff noted that applying the NVAFs would provide a more reliable estimate of existing stand volume than using the 1976 loss factors. According to MSRM staff, in their experience the average NVAF is approximately four percent for the general area around TFL 30.

Using information provided by Canfor and the four-percent estimate of the average NVAF, MSRM staff calculated volume ratio adjustments for age classes six and seven combined (101 years to 140 years old) and eight and nine combined (141 years and older). According to these calculations, the volumes used in the analysis for existing stands in age classes six and seven are under-estimated by 12 percent and those in age classes eight and nine are over-estimated by five percent.

The licensee provided a sensitivity analysis indicating that reducing estimates of existing stand yields by ten percent reduces short-term timber supply by approximately ten

percent. Increasing existing stand yields by ten percent similarly increases short - (after the first year in the forecast) and medium-term timber supply by approximately ten percent.

I am well aware that the estimated average NVAF provided by MSRM is uncertain. However, I also note that a potential five percent volume over-estimate for age class eight and nine stands represents a risk to short-term timber supply, given that much of the harvesting in the short- to mid-term is projected to occur in these stands. Offsetting this over-estimate is the apparent under-estimate of the volume of stands in age classes six and seven. For this determination I accept that the volume under-and over-estimates in the two components of the older stands in the inventory likely offset each other, and that the timber supply would be largely unaffected if corrected values were used. To reduce the uncertainty associated with existing stand yields, I strongly suggest that Canfor complete the destructive samples and develop NVAFs to replace the existing loss factors.

Expected rate of growth

I have considered all of the factors applied in the base case forecast that account for the expected rate of growth. I accept without further discussion the assumptions concerning aggregation procedures and operational adjustment factors employed in the model.

- site productivity estimates

Inventory data include estimates of site productivity for each forest stand, expressed in terms of a site index that is based on a stand's height at a given age. The productivity of a site largely determines how quickly trees grow. This in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size.

The most accurate estimates of site productivity can be derived from measurements in stands aged between 30 and 150 years. In stands aged less than about 30 years (particularly stands less then 15 years), the growth history of trees has not been long enough to allow for accurate measurement of site productivity using conventional site index tools (site curves) with inventory estimates of height and age.

Site productivity estimates derived from measurements of older stands are often under-estimated because the trees are well past the age of maximum height growth and may have been affected by disease, insects and top damage. As a result, when site productivity estimates from older stands are used to predict the growth potential of young replacement stands, future stand yield may also be under-estimated.

This has been verified in several areas of the province where studies—such as the Old-Growth Site Index (OGSI) 'paired plot' project and the 'veteran' study—as well as results from using the Site Index Biogeoclimatic Ecosystem Classification System (SIBEC) suggest that actual site indices are frequently and significantly higher than those indicated by existing data from old-growth forests. In recent years it has been concluded from such studies that site productivity has generally been under-estimated in older inventories; managed stands tend to grow faster than projected by inventory-based site index estimates

from old-growth stands.

For the TFL 30 base case forecast, site indices for existing and future managed stands were estimated based on methods described in the report *Potential Site Index Estimates for the Major Commercial Tree Species on TFL 30*. On average, the resulting site indices at age 50 years were 5 metres greater than those reported in the VRI data. For high elevation areas where insufficient samples could be established to provide reliable site index estimates, an elevation model was used that is based on expert opinion.

BCFS Research Branch staff have reviewed the methods used in the analysis to estimate site index and are generally satisfied with the results. However, they note that site indices for higher elevation stands, covering 15 percent of the timber harvesting land base, cannot be substantiated because of the lack of harvesting history in these areas, and therefore the lack of young stands most suitable for use in estimating site index.

I have reviewed and discussed the information regarding site productivity estimates with BCFS staff. In general, I accept that the methodology used to estimate site indices for the base case was reasonable. I note the uncertainty about the estimates used for stands at higher elevations. I further note that according to a sensitivity analysis provided by Canfor, any changes in site index estimates compared to the base case would affect mid- and long-term timber supply. In view of the uncertainty regarding this factor, I encourage the licensee to examine and refine the site index estimates for stands at higher elevations for consideration in the next AAC determination. For this determination, I conclude that the assumptions concerning site productivity applied in the base case are the best available information.

- volume estimates for managed stands

To estimate volumes for managed stands, Canfor used the Table Interpolation Program for Stand Yields (BatchTIPSY version 2.5r), developed by the BCFS Research Branch. It was used to generate yield tables for existing and future managed stands; existing managed stands cover 31 percent of the forested area of the TFL.

BCFS Research Branch staff indicated that managed stand yields are likely over-estimated in the base case because Canfor assumed that trees seeded naturally in plantations are evenly distributed, grow at the same rate, and have the same regeneration delay as planted seedlings. In addition, increased growth rates associated with genetic improvement were applied to spruce trees that were seeded naturally in spruce plantations. Research Branch staff estimate that for the above-noted reasons, managed stand yields may be over-estimated by about four percent in the mid-term and five percent in the long term.

Having discussed with Research Branch staff in detail the assumptions concerning regenerated stand yields, I concur with their assessment and have factored into this determination an over-estimate in medium-term timber supply of four percent and long-term timber supply of five percent. I will discuss this further in '*Reasons for Decision*'.

- *minimum harvestable ages*

In timber supply analysis, estimates are made of the earliest age at which a forest stand has reached a harvestable condition or has met minimum merchantability criteria. The assumptions largely affect when second-growth stands will be available for harvest in the model. In practice, many forest stands will be harvested later than the age at which they reach minimum merchantability, due to economic considerations and constraints on harvesting that arise from managing for other forest values such as visual quality, wildlife and water quality.

In the base case, the minimum harvestable ages assumed for natural stands were based on the Ministry of Forests – *Prince George Region Timber Tenure Administrative Guideline for Priority Cutting Ages approved by Regional Manager, October 22, 1998.* For coniferous stands these ages ranged from 81 years for pine-leading stands to 121 years for subalpine fir-leading stands. The minimum harvestable ages for managed stands were set at 95 percent of the culmination of mean annual increment (the age at which the volume/age ratio is at a maximum).

The currently existing stands will be available for harvest in the model during the 41- to 60-year period when timber supply is most limited. Information provided in the analysis indicates that during the period from 35 to 60 years in the base case forecast, stands were harvested on average from 2 to 5 years past their assigned minimum harvestable age. I further note that over time the regeneration regime assumed by the licensee for TFL 30 will result in one-third of the TFL being covered with pine-leading stands.

A sensitivity analysis provided by Canfor indicates that increasing the minimum harvestable ages by 10 years above those assumed in the base case reduces timber supply by an average of 6 percent in the short term, and by an average of 25 percent during the 41 to 60 year period.

I note that predicting harvesting and saw milling economics, which are related to the size of trees harvested and therefore the age at which trees are harvested, is subject to considerable uncertainty. By association, predicting minimum harvestable ages is also subject to considerable uncertainty. The steady diet of stands being harvested in the base case at very near their minimum harvestable ages during a significant period in the mid-term of the harvest forecast is a concern, given this uncertainty. Furthermore, should these stands in fact not become available for harvest at the assumed minimum harvestable ages, timber supply in the short- and mid-term will be significantly reduced compared to the base case, as illustrated in the sensitivity analysis. I therefore request that the licensee review and substantiate its assumptions for defining minimum harvestable ages, prior to the next determination. I have considered the uncertainty in the assumptions regarding minimum harvestable ages as a significant factor affecting this determination as discussed in '*Reasons for Decision*'.

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

Expected time for forest to be re-established following harvest

I have considered the information regarding regeneration delays, impediments to regeneration and not-satisfactorily-restocked areas. I accept without further discussion the base case assumptions concerning these factors.

(iii) silviculture treatments to be applied to the area,

Silvicultural treatments to be applied

I have considered the information regarding regeneration, genetic improvement, fertilization, juvenile spacing, stand conversion, silvicultural systems and commercial thinning. I accept without further discussion the base case assumptions concerning these factors (except for the issue concerning genetic improvement noted above under *'volume estimates for managed stands'*).

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

Timber harvesting

I have considered the information regarding the utilization standards and the decay, waste and breakage factors assumed in the base case for TFL 30. I have also considered the information concerning the harvest rules applied in the model. I am satisfied that the base case assumptions concerning utilization standards and harvest rules were appropriate. I have considered the allowance for decay, waste and breakage under '*estimates of existing stand volumes'*, above, and therefore I will not discuss these allowances further here.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production,

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

I have considered the information regarding archaeological sites, riparian resources, wildlife including caribou, watersheds and stand-level biodiversity. I accept without further discussion the assumptions applied in the base case concerning these factors.

- *antique forests*

I am aware that during the recent Prince George Timber Supply Area (TSA) timber

supply review, there was considerable public comment concerning the old-growth cedar-hemlock stands in the Interior Cedar Hemlock (ICH) biogeoclimatic zone in the eastern portion of the TSA. Many submissions described these stands as being ecologically significant because they represent one of the few remaining inland rainforests in the world. Concern was expressed that many of these "antique" cedar-leading stands, some of which may have not experienced disturbance for "thousands of years", would be lost over time due to harvesting activities. A number of people suggested that, until more is known about these ecosystems, they should be excluded from the THLB.

According to Ministry of Forests regional staff, the stands in the ICH located on TFL 30 have not received the same level of interest as those in the Prince George TSA. In fact, no public input on this issue was received during the review of draft Management Plan No. 9.

In consideration of the public interest concerning stands of this type in the area adjacent to the TFL, I encourage the licensee to pay special attention when planning harvesting in this zone to ensure no unique values are lost. For this determination no current management practices within this zone were brought to my attention that differ from the assumptions applied in the base case. I am therefore satisfied that the assumptions applied in the base case reflect current practice.

- recreation

During the public review process for MP No. 9 of TFL 30, Canfor received several comments concerning the recreation resource. Protection of the Farm Trail, which provides access to the sub-alpine and alpine ecosystems through the Woodall recreation area, was seen as a priority by two respondents. Canfor intends to maintain the Woodall recreation area as a recreation reserve, and this was reflected in the base case.

Caving is an increasingly popular recreation experience on the TFL, with the most prominent karst formations occurring in the Woodall and Bear Paw Ridge areas. The University of Northern British Columbia caving club commented on the importance of this resource. It provided Canfor with information regarding karst locations and this information is included in Canfor's Recreation Features Inventory.

Access maintenance for snowmobile riding was raised as an issue by the Prince George Snowmobile Club. Canfor agreed to notify the club during road deactivation planning.

I have reviewed the assumptions applied in the base case concerning recreation resources on TFL 30 and I am satisfied that they reflect current management and address the concerns expressed during the public review process. I have not adjusted my decision on this account.

- identified wildlife

For wildlife species considered to be at risk, the Conservation Data Centre of British Columbia maintains forest district tracking lists. These lists identify species and plant associations considered to be at risk (i.e., endangered, threatened, vulnerable or sensitive) and which are known to occur, are strongly expected to occur, or which have occurred in the past within a given forest district. The Identified Wildlife Management Strategy

(IWMS) addresses habitat management for specific species considered at risk.

Identified wildlife refers to species at risk (red- and blue-listed) as well as regionally significant species that are potentially affected by forest management activities and that have not been adequately accounted for through existing management strategies. While the biodiversity and riparian provisions of the Forest Practices Code are intended to provide for the needs of most wildlife species, some species that are considered to be at risk require special management practices. Volume One of the Province's *Identified Wildlife Management Strategy* (IWMS)—released in February 1999—provides mechanisms for managing critical habitat for identified wildlife species including Wildlife Habitat Areas (WHAs), General Wildlife Measures (GWMs) and higher level plan recommendations.

Identified wildlife potentially occurring within or adjacent to TFL 30 include Rocky Mountain bighorn sheep, the northern long-eared myotis, bull trout, the short-eared owl, grizzly bear, fisher, wolverine, western grebe, American bittern, trumpeter swan, and sandhill crane.

The exact location or precise amount of WHAs that will be required within the timber harvesting land base to implement the IWMS has not yet been established. However, I note that government has limited the impact of management for identified wildlife in the short term to a maximum of one percent of the harvest level for the province. Given the Province's commitment to implementing the IWMS, and given the policy decisions and projected one-percent impact—and noting the potential occurrence of several identified wildlife species within TFL 30—I find it appropriate to account for an expected, but not fully quantified, impact on the timber supply of TFL 30. I therefore conclude that timber supply may be up to one percent lower than projected in the base case and have considered this in '*Reasons for Decision*'.

- *visual quality*

The Prince George Forest District manager established scenic areas and visual quality objectives for TFL 30, based on the 1994 Visual Landscape Inventory (VLI). In 1999, the VLI was updated and revised scenic areas were made known by the district manager. However, the visual quality objectives have not yet been formally established. District staff confirm that the new information is used in current planning and operations and expect that it will form the basis for the establishment of new visual quality objectives. Therefore, for the purposes of MP No. 9 and the analysis, the licensee has reflected the new VLI.

I accept that the 1999 VLI forms the basis for current management on TFL 30. I expect that before the next AAC determination, visual quality objectives will be established which reflect current practice.

- *biodiversity*

Biodiversity is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems and the evolutionary and functional processes that link them. Under the Forest Practices Code,

biodiversity in a given management unit is assessed and managed at both the landscape and stand levels.

- *landscape-level biodiversity*

The delineation and formal designation of 'landscape units' is a key component of a subregional biodiversity management strategy. A landscape unit is an area established by the district manager, generally up to 100 000 hectares in size, based on topographic or geographic features such as a watershed, or series of watersheds, to manage biodiversity and other forest resource values.

The *Biodiversity Guidebook,* the *Landscape Unit Planning Guide* and *Higher Level Plans: Policy and Procedures* all provide policy and guidance on management for landscape-level biodiversity. The *Landscape Unit Planning Guide* provides guidance on which components of the full range of recommendations included in the *Biodiversity Guidebook* should be implemented to achieve a balance of forest management objectives. The *Landscape Unit Planning Guide* contains forest cover constraints for old seral forest that are recommended for application at the biogeoclimatic variant level within each landscape unit. The recommendations are stated as a minimum percentage of the productive forest to be retained in stands above a specified age that varies by ecosystem type. The guide also allows the old seral requirement to be phased in over time in landscape units with a lower biodiversity emphasis.

The 1996 Higher Level Plans: Policy and Procedures guide provides further policy guidance. It outlines three biodiversity emphasis options (BEOs)—lower, intermediate and higher—that may be employed when establishing biodiversity management objectives for a landscape unit. Three draft landscape units have been delineated within TFL 30, the Seebach, Averil and Woodall landscape units, and these were assigned a lower biodiversity emphasis option in the *Landscape Unit Planning Strategy for the Prince George Forest District.*

In the base case, the licensee used the three landscape units and, in accordance with the *Strategy* and direction from the *Landscape Unit Planning Guide*, the licensee applied the old seral requirements for each biogeoclimatic variant in each landscape unit and phased these in over three rotations. In the model, only stands greater than two hectares in size were allowed to contribute to old-growth targets.

Currently very few stands in Natural Disturbance Types (NDT) 1 and 2 are older than age 250 years, the age at which stands in these NDTs are assumed to have attained desirable old-growth characteristics. Over time in the base case, sufficient area of stands over 250 years is recruited to meet the targets. I understand that for these areas there is some question how well inventory age reflects the actual time elapsed since stands were disturbed, noting that stands from 140 to 250 years old are well represented in the age class distribution. Nevertheless, if time spans in the order of 250 years are needed to produce stands with desirable characteristics for the maintenance of biological diversity, as may be the case for this area, then the assumptions applied in the model are satisfactory.

In September 2001, Canfor certified TFL 30 to the Canadian Standards Association

(CSA) Sustainable Forest Management (SFM) standard. The CSA criteria include developing a Sustainable Forest Management Plan that is based on the SFM system standard of establishing values, goals, indicators and objectives (VGIO) for six criteria and 21 elements of sustainability. The process also requires that the VGIO be developed in association with a Public Advisory Group (PAG), and this was initiated in September of 2000. One of the recommendations of the PAG was that objectives for the 'mature-plus-old' seral stage also be applied in NDTs 1 and 2, a departure from current provincial policy.

In the base case the 'mature-plus-old' seral stage targets recommended in the *Biodiversity Guidebook* for NDTs 1 and 2 were applied. The targets were met in all biogeoclimatic variant/landscape unit combinations throughout the forecast period.

Having reviewed the assumptions applied in the base case concerning landscape level biodiversity, I find they reflect current knowledge and practice. I expect that if the ongoing research reveals more appropriate seral stage targets or methods for protecting the important old-growth characteristics in NDTs 1 and 2, the findings will be reflected in future analyses. For this determination I accept the assumptions as modelled in the base case.

- patch size distribution

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species that are dependent on, or are strongly associated with, old-growth forests. Although some general forest management practices can broadly accommodate the needs of most ecosystems, more often a variety of practices are needed to represent the different natural disturbance patterns under which ecosystems have evolved.

In its Management Plan No. 9, Canfor indicates that it will manage TFL 30 for a patch size distribution that moves the landscape towards a more natural distribution of forest stands and avoids landscape fragmentation. With agreement from staff in what was then the Prince George Forest Region[1], for the base case Canfor assumed patch size targets taken from the *Landscape Unit Planning Guide* are applicable to each landscape unit rather than each landscape unit/NDT combination as recommended in the guide. Some of the combinations cover too little area to allow for meaningful analysis of patch-size targets.

In April 2002 the regional manager of the Prince George Forest Region and the Ministry of Sustainable Resource Management's regional director of the Omineca Peace Region co-signed a letter to all district managers in the Prince George Forest Region indicating that the guidance in the document *Natural Disturbance Units of the Prince George Forest*

[1] Now part of the Northern Interior Forest Region

Region constitutes the best available information when preparing operational or landscape level plans. According to this document, patch size targets should be applied at the natural disturbance unit (NDU) level and in general the assessment area should be four to five times larger than the largest allowable patch size. The Prince George Forest Region ecologist has indicated that larger patches than recommended in the *Landscape Unit Planning Guide* are suitable for the Prince George Forest Region, noting that 1000-hectare patches, rather than the standard 250 hectare patches, are acceptable in NDTs 1 and 2. On that basis, new guidelines are being developed for the Northern Interior Forest Region.

For the base case the licensee used the patch-size targets recommended in the *Landscape Unit Planning Guide*. For the Seebach and Woodall landscape units which are predominantly in NDTs 1 and 2, it assumed the largest patch size permissible was 250 hectares. For the Averil landscape unit, with a large proportion of the area in NDT 3, the licensee assumed the largest patch size permissible was 1000 hectares.

The licensee conducted a sensitivity analysis to test the implications for timber supply of managing for larger patch sizes. For this analysis it applied no constraints to control the patch size distribution and no adjacency requirements. In the resulting forecast the current AAC of 350 000 cubic metres could be maintained for three decades before timber supply declined by ten percent to the mid-term level.

Having reviewed the direction provided by regional management and the recommendations from the regional ecologist, I find that the assumptions applied in the base case are likely significantly more constraining than current direction and practice. I also note, however, that in the sensitivity analysis no constraints were applied to produce the desired patch size distribution and this may have caused an over-estimate in timber supply in the short- and more probably in the mid-term. For this determination I therefore consider the base case to under-estimate short- and mid-term timber supply by an unknown amount, as discussed below under '*Reasons for Decision*'.

Given that patch management is a relatively new approach to locating areas available for timber harvesting, patch sizes need to be managed over the very long term and the appropriate patch size distribution for each NDU is still being studied and developed, I believe evaluating the extent to which patch-size management is current practice is subject to considerable uncertainty. I therefore ask the licensee to report on its success in meeting the targets for the next AAC determination.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

I have considered the information regarding the twenty-year plan and the Prince George Land and Resource Management Plan. I accept without further discussion the assumptions concerning these factors.

(b) the short and long-term implications to British Columbia of alternative rates of timber harvesting from the area,

Alternative rates of harvest

The nature of the transition from harvesting old-growth forests to harvesting second-growth forests is a major consideration in determining AACs in many parts of the province. In the short term, the presence of large timber volumes in older forests often permits harvesting above long-term levels without jeopardizing future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that current and medium-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber supply should remain sufficiently stable so that there will be no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

Using base case assumptions, the licensee prepared one alternative to the base case forecast. For the alternative forecast an initial harvest level of 350 000 cubic metres per year was maintained for the first five-year period. The harvest level then declined by 15 percent every five years for 15 years to a mid-term level of 213 539 cubic metres per year. In the base case, after the first decline of 19 percent the rate of decline was kept to only 12 percent every five years.

I have reviewed the alternative harvest forecast provided by the licensee and I note that it is possible to harvest significantly more volume than indicated in the base case forecast for the first decade without affecting the long-term harvest level. However, as discussed under '*Timber Supply Analysis*', in the first period Category A blocks were harvested even if the level of violation of forest cover constraints increased. No information was provided to quantify the level of constraint violation in the alternative harvest forecast compared to the base case. I find it likely that the additional volume harvested in the short term in the alternative forecast caused increased violation of forest cover constraints compared to the base case. I will discuss this further under '*Reasons for Decision*'.

- community dependence on the forest industry

The licensee operates TFL 30 mostly under contract. Based on 1999 employment multipliers from the *Prince George Timber Supply Area Analysis Report (September, 2001)*, the number of jobs directly attributable to harvesting and silviculture on TFL 30 is about 74 person-years at the current rate of harvest. I am aware of the importance of the forest industry to the Prince George area, noting that approximately 30 percent of household income is derived from the forest industry in general (based on *The 1996 Forest District Tables*).

I have reviewed the information and am mindful that the volume harvested fromTFL 30 contributes to the employment in the local area.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

Timber processing facilities

- existing mills

Timber volume harvested from TFL 30 represents about 4 percent of the licensee's total current AAC of 8.2 million cubic metres. The volume harvested from the TFL supports a number of sawmills in the Prince George area, including the Polar Mill in Bear Lake, the Prince George Sawmill in Fraser Flats, and the Rustad Sawmill in Prince George. As well, some fiber material contributes to the chip supply for Canfor's three pulpmills also located in Prince George.

Timber harvested on TFL 30 has also been processed in the Upper Fraser Sawmill. However, Canfor recently announced that this mill will be closing in 2003. Canfor plans to upgrade the Prince George Sawmill and expects that this will provide for off-setting employment opportunities.

I have reviewed the information and am mindful that the volume harvested from TFL 30 makes an important contribution to the company's fibre needs in the local area.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia;

Economic and social objectives

- Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4).

This letter and memorandum include objectives for forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomic areas. To encourage this the Minister suggested consideration of partitioned AACs.

The Minister's memorandum addressed the effects of visual resource management on timber supply. It asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unreasonably restrict timber supply.

I have considered the contents of the letter and memorandum in my determination of an AAC for TFL 30. I note that commercial thinning is not occurring to any significant extent on TFL 30 and the licensee has not indicated any plans to undertake any commercial thinning in its proposed MP No. 9. I am also satisfied that no further significant opportunities exist at this time for harvesting in previously uneconomical areas, beyond what was incorporated into the base case assumptions.

For this determination, I am satisfied that no other opportunities exist to significantly improve timber supply and that no partition of the AAC is warranted at this time.

- local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives.

The licensee indicates in its Management Plan No. 9 that it actively solicited input on the draft management plan. In the plan it also indicates that in accordance with its environment policy and CSA certification efforts, it will involve the public to assist in the establishment of local Values, Goals, Indicators and Objectives (VGIO). This also includes aboriginal peoples with respect to their rights and interests. To this end, Canfor has established a Public Advisory Group (PAG) that includes a broad range of interests, including First Nations, and Canfor intends to continue the PAG to monitor and evaluate performance and provide suggestions for continuous improvement.

I am satisfied that the licensee has carried out its public involvement obligations satisfactorily, and that no specific issues were identified in public review which would impact this determination.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Abnormal infestations and salvage

- unsalvaged losses

In the base case forecast, Canfor assumed that 3640 cubic metres per year are lost as a result of fire, insects and windthrow. This represents about 5 percent of the total amount of timber damaged; the remaining 95 percent is recovered through salvage operations.

I note that the mountain pine beetle epidemic that is spreading across the interior of British Columbia is not a significant threat to TFL 30. Only 4% of the merchantable volume on TFL 30 is pine. I am satisfied that any attacked pine trees can be salvaged under the AAC I have determined.

I accept that the estimates of unsalvaged losses represent the best available information and are appropriate for use in this determination.

Reasons for Decision

I have considered the information discussed throughout this document, and I have reasoned as follows.

For the reasons stated in '*Timber Supply Analysis*' and from reviewing the considerations as recorded above, I accept the licensee's base case forecast as an adequate basis from which to assess timber supply for this AAC determination.

In determining this AAC, I have identified factors which, considered separately, indicate that the timber supply may be either greater or less than that projected in the base case. Generally some of these factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by adding an element of risk or uncertainty to the decision but cannot be reliably quantified at this time. I have accounted for these latter factors in my determination in more general terms.

In this rationale, I have identified several factors for which I believe the base case assumptions differ from current operational practices or conditions. These factors are summarized below.

For this determination, I have identified several factors that I believe have a downward influence on timber supply compared to the base case projection:

- *non-TFL private land* – I find it uncertain that the landowner will manage this 429 hectare parcel in a way that will contribute to landscape-level biodiversity objectives or any other objectives on TFL 30. I conclude that the base case timber supply is likely over-estimated by a small amount in the long term.
- *managed stand volumes* – The licensee assumed that trees seeded naturally in plantations are evenly distributed, grow at the same rate, and have the same regeneration delay as planted seedlings. In addition, increased growth rates associated with genetic improvement were applied to spruce trees that were seeded naturally in spruce plantations. I conclude on this account that timber supply was likely over-estimated in the base case by about four percent in the mid-term and five percent in the long-term.
- *Identified wildlife* – I note the potential occurrence of several identified wildlife species within TFL 30 and that no WHAs have yet been established on the TFL. I therefore find it appropriate to account for up to a one-percent decrease in timber supply on this account over the forecast period.

For this determination, there is one significant factor that I believe acts to increase timber supply compared to the base case projection:

- *patch size targets* – I noted that patch size targets are currently under review for the Northern Interior Forest Region and that larger patch sizes than assumed in the base case are thought to be more appropriate for some areas on TFL 30. When no patch-size constraint was applied in a sensitivity analysis, the current harvest level of 350 000 cubic metres per year could be maintained for thirty years, a considerable increase in timber supply over the base case. I concluded that on this account timber

supply in the base case is under-estimated by an unknown amount in the short- and mid-term.

For this determination, there is one factor that I believe is subject to considerable uncertainty and therefore poses some risk to short – and mid-term timber supply:

- *minimum harvestable ages* – I note in the base case that stands are being harvested at very close to their minimum harvestable ages in the mid-term. I also consider the minimum harvestable ages to be relatively low for existing and future managed pine stands. Based on my review of the ages at which stands are harvested in the base case and the sensitivity analysis that was conducted to test the implications for timber supply of increasing minimum harvestable ages by ten years, I conclude mid-term timber supply is very dependent on harvesting stands at the assumed minimum harvestable ages. As short-term timber supply was also reduced in the sensitivity analysis, in my view this represents a downward risk in the short- and mid-term.

In reaching my determination I have considered the above factors and I note that all but one of them—*patch size targets*—indicate that the timber supply is likely over-estimated during the short, medium or long term in the base case. I am mindful of the alternative to the base case harvest forecast that was provided in the analysis. However, as I noted above, I find it likely that the additional volume harvested in the short term in the alternative forecast caused increased violation of forest cover constraints compared to the base case. I therefore view this harvest forecast with some caution and consider that timber supply in the short term may not be as flexible as it portrays.

Of the factors that indicate timber supply may be over-estimated in the base case, the assumptions regarding minimum harvestable age are of considerable concern because of the reliance in the base case on harvesting stands at very close to their minimum harvestable ages in the mid-term. In conjunction with the assumptions concerning managed stand yield estimates and identified wildlife, I believe the short-and mid-term timber supply in the base case may be over-estimated by approximately five percent.

I acknowledge that the ecological rationale for patch-size distribution is changing in the Northern Interior Forest Region and that this may make available significant additional timber supply in the short - and mid-term compared to the base case. However, I note that in the sensitivity analysis provided to illustrate this point, no forest cover requirements governing patch size distribution were applied, and this may have resulted in an over-estimate of timber supply. Furthermore, in the sensitivity analysis a timber supply deficit is still projected for the period from 30 to 60 years from now.

Given the lack of a forest cover requirement governing patch size distribution and the other factors that indicate timber supply may be over-estimated in the base case, in particular the assumptions concerning minimum harvestable age, I believe the timber supply deficit projected in the sensitivity analysis for the period from 30 to 60 years from now may well be greater than shown.

Having considered the available information, I find the timing and depth of the reduction from the current AAC to a lower harvest level in the mid-term quite uncertain. I therefore conclude that for this determination a small reduction to 330 000 cubic metres is

warranted. This will contribute to stepping the harvest down to the mid-term level and help to avoid abrupt and significant future declines.

Determination

I have considered and reviewed all the factors documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, can best be achieved by establishing an AAC of 330 000 cubic metres, which is a 5.7 percent reduction.

This determination is effective July 1, 2003 and will remain in effect until a new AAC is determined, which must take place within five years of the date of this determination unless the next determination is formally postponed according to the provisions of Section 8 of the *Forest Act*.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than the five years required by legislation.

Implementation

In the period following this determination and leading to the subsequent determination, I encourage BCFS and licensee staff to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognize that the ability to undertake these projects is dependent on the availability of staff time and funding. However, this work will be important to help reduce the risk and uncertainty associated with key factors that affect timber supply on TFL 30. I encourage the licensee to:

- examine the excluded low productivity stands to confirm the amount that will be harvestable in the short term;

- complete sampling necessary to develop Net Volume Adjustment Factors to replace the existing loss factors;
- examine and refine the site index estimates applied in higher elevation stands;
- review and substantiate assumptions for defining minimum harvestable ages;
- report on the success in meeting patch-size targets for the next determination.

Ken Baker

Ken Baker
Deputy Chief Forester
June 12, 2003

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, reads as follows:

Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

(iii) silviculture treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

(a) encourage maximum productivity of the forest and range resources in British Columbia;

(b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;

(c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;

(d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and

(e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
Ministry of Forests
OFFICE OF THE MINISTER

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: **The Crown's Economic And Social Objectives Regarding Visual Resources**

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

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In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis*.

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests